Keep the Children Walking: Active School Travel in Tirana, Albania

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Abstract

This paper examines how characteristics of the physical and socio-economic environment influence children's school travel mode in Tirana, the capital of Albania. A survey of students aged 11 to 13, revealed that an overwhelming majority walk to school, while bicycling and bus use are minimal. Students usually walk to school as part of a group of schoolmates, attend schools that are located relatively near their house, face relatively few major road crossings during their journey, and belong to families that are less likely to own a car. Children who are driven to school (only 13.5% of our sample) usually come from higher income families and live farther from the school. Although Tirana's high residential density has environmental drawbacks, we deem it positive in that its result is that most students live very close to their schools and in close proximity to classmates walking to school. The fine grain pattern of the urban public school network contributes to the short distances between schools and homes. We provide a number of recommendations for the promotion of walking in home-school trips, as well as for the future physical development of the city and the school network.

Introduction

The transition countries of Eastern Europe, are experiencing a fast shift from mass transit to automobile travel, with grave consequences in terms of traffic flow, road safety, livability, and environmental quality. In these settings, home-school travel, which represents a substantial share of daily trips, is often overlooked in sustainable mobility discourses. Most of the existing studies on this topic, which are conducted in Western nations, stem from the concern that there is a link between active forms of school travel (walking or biking) and the general health of schoolchildren (van Loon and Frank 2011). However, home-school travel also has an impact on urban livability. While research on this topic Eastern Europe is virtually non-existent, based on adult travel studies (see Pucher and Buehler 2005) children school travel here is expected to raise major safety, equality, and environmental quality concerns. In turn, it is evident that the urban form and amenities determine whether students travel actively and autonomously to school (van Loon and Frank 2011).

The study area of our research is Tirana, the capital of Albania. The purpose of this study, conducted in 2012, is to examine how characteristics of the physical environment influence children's travel mode choice between home and school in relation to socio-economic variables. In the framework of this study, we carried out a travel behavior survey of approximately 500 students in grades 6 through 8 from four schools and found that an overwhelming majority of students (78.9%) walk to and from school. This finding contrasts with a general perception in Tirana, perpetuated by the local media, that a substantial portion

of children are driven to school. While Albania's economic development stage may largely explain this outcome, a number of environmental factors may account for it too. For example, compactness is generally found to contribute to the minimization of travel distances (Boussauw *et al.* 2012). A synopsis of Tirana's recent urban development patterns and mobility issues provides an understanding of the dynamics that lead to such a high portion of students walking to school.

The first two parts of the article provide the study context. They contain a brief discussion of the current trends in transport planning in Eastern Europe, and present an overview of the relevant literature on children's travel, focusing on active school commute prevalence and correlates. (Active travel includes walking and cycling, but the latter is insignificant in Tirana.) The third part of the article describes Tirana's urban setting, with particular focus on spatial structure, mobility, and education provision. The fourth part describes the study design and methodology and presents the results using descriptive statistics, correlation analysis, and regression models. The conclusions provide a number of policy recommendations.

As a case study, this article produces concrete, in-depth, context-dependent knowledge rather than "hard" theory (see Flyvbjerg 2006). While in most studied contexts a majority of children are driven to school (though active modes, especially walking, are increasingly used for the trip home) in Tirana an exceptionally high proportion of children walk to and from school. In view of this fact, the main concern here is an expected shift towards more children travelling by car in the future, as incomes and car ownership grow.

Without data on school travel in other Eastern European capitals, it is impossible to say whether Tirana illustrates the problems of the region as a whole. However, studies on adult travel and land use trends in Eastern Europe point to a rapid increase in car ownership and growing sprawl and suburbanization, amidst a laissez faire policy environment. Hence, children are likely to become more car-dependent as well. Therefore, the same goals and policies that we recommend may be applicable to school travel planning in other Eastern European cities of similar size.

Transport Issues in Post-Socialist Eastern Europe

At the end of communism, the urban transport systems of Eastern Europe and Central Asia (the ex-Soviet republics) were overwhelmed by two major developments: (1) the precipitous modal shifts from public transport and non-motorized modes to private automobiles, and (2) the suburbanization of low density housing and commercial activities beyond the built-up area created during communism, which generate additional demand for car travel. In this relatively new "car culture", the car signifies not only a transport mode, but also a powerful status symbol (Suchorzewski 2005; Pucher and Buehler 2005; Dimitrov 2004; Suditu *et al.* 2010). In terms of modal shift, in Albania the transformation was more extreme than elsewhere because car ownership was prohibited during communism. In terms of land use, by contrast, in Tirana no middle class suburbs developed.

While the dramatic shift from public transport, biking, and walking to the private car generally reflects consumer preference for the convenience, comfort, speed, flexibility, independence, and status of the car, it has generated some serious problems: rising roadway congestion, parking shortages, air pollution, noise, and traffic crashes. The sudden increase in motorization has overwhelmed roadway networks. In addition, speeding and reckless driving are standard, since enforcement of traffic regulations is very lax in some post-socialist countries (Pucher and Buehler 2005).

The poorer countries in the region (i.e. Western Balkan states) do not have adequate governance structures, funds, and political will to develop integrated and socially and environmentally sustainable transportation systems (see Boussauw 2012; Nientied 1998; Andrews 2005). It is also clear that the attainment of sustainability objectives in transport will require significant social and lifestyle changes, a difficult task in view of the psychological dimension of auto-ownership (the perception of the car as high status mode). The physical proximity to the west and the motivation to join the European Union (which requires compliance with environmental directives) has been an important catalyst for change (Pucher and Buehler 2005; REC 2008). However, the track record of transport policy in Western European cities in terms of reducing car use is less than excellent. Moreover, experience has shown that even with Western assistance large scale institutional reform is not likely to occur in Eastern Europe. Often, transport goals need to be modest and incremental (Stead *et al.* 2008).

Children's Travel Behavior and School Commute: A Literature Review

Children's travel and independent movement as an area of inquiry dates from the 1970s in the U.K. Two seminal works, Ward's "The Child in the City" (1978) and Hillman's *et al.* "One False Move" (1990), advocated a lobby on behalf of children in transport planning. Their concerns stemmed from the suburbanization trends of that era, which led to intense car use in wealthy peripheries and safety and security problems in deprived urban cores, thus limiting both urban and suburban children's free mobility and access to the city. The 1970s marked the beginning of the evolution from "outdoor" and "walking" children to "indoor" and "chauffeured" children.

In the last decade, studies have multiplied, especially in Western Europe, the UK in particular, and North America (see Hillman 1999; O'Brien *et al.* 2000; McDonald 2005; Mackett 2012). This reflects growing concerns about health and the environment. Studies have found that compared to previous generations, the travel patterns of children here have changed enormously. Parents are adapting to the modern nature of urban living by confining children to the home or by escorting and/or chauffeuring them in cars. Car travel has become a form of mobile child care, while allowing children out unaccompanied has become a marker of neglectful parenthood. However, car-dependency at an early age may be damaging from an environmental and public health perspective because children's current travel behavior may affect their future travel behavior as adults, while reduced physical activity and exposure to the outdoor environment may affect children's physical and mental health. While the reduction in children's walking and cycling is related to the increase in car ownership, parents' changing attitudes are also due to the fact that the outside world is seen as a hostile, dangerous place where children are likely to be harmed by motor vehicles or adults. Children themselves often mirror their parents' habits and views in regards to travel (Zwerts *et al.* 2010).

Negative perceptions are mostly justified: road injuries are a reality and the quality of public outdoor spaces, especially in the poorer sections of big cities, has declined. Air, noise, and visual pollution (i.e. traffic and parking), as well as poor urban design, with spaces unfriendly to walking, are widespread outside pedestrianized historic city centers. Other factors, unrelated to the (built) environment, include increased incomes, increased female participation in the workforce, cultural shifts from free play to organized activities, and increased use of personal electronic home entertainment. In some countries, school choice policies that allow children to attend any school within their city, rather than the nearest to home, have contributed to growing car use for children's transport (Mackett 2012).

Many studies have focused on the school commute of children. Most of them are western-based and cross-sectional (Wong *et al.* 2011; Lubans *et al.* 2009; Faulkner *et al.* 2009; Davison *et al.* 2008; Sirard and Slater 2008). Several recent systematic reviews consider the relationship between active school travel, the built environment, and health or fitness correlates. Only one Southeast European study was identified (Loucaides *et al.* 2010), which was conducted in Cyprus (with adolescents rather than children).

The reviews, as well as the studies themselves, have been primarily motivated by the increasing prevalence of obesity in children and youth, which is found to be in part the result of insufficient physical exercise and excessive car travel, including travel for school trips. The reviews report strong evidence of a positive association between active school travel and other physical activities, but are less unanimous on the assumed link between active school travel and lower body mass index. However, Faulkner *et al.* (2009) and Sirard and Slater (2008) indicate that possible health benefits of active commuting to school include higher cardiovascular fitness among youth, which is linked to higher rates of physical activity.

Generally, it is difficult to compare studies on children's school commute due to the heterogeneity of sample sizes, family composition, school systems, and cultural and environmental characteristics, all of which have been examined as potential predictors of active school travel. Also, some of the inconsistency in empirical findings may be related to the modifiable areal unit problem, a measurement issue comprised of scale and zoning effects. However, a statistically consistent and reliable spatial unit specification for the study of school travel behavior may not exist, as different environmental factors may operate on the mode choice process at different scales (Mitra and Buliung 2012).

Some studies separate the "to" and "from" school trips because in western settings the return trip is complicated by afterschool activities and caregiver schedules (given that many children are chauffeured). In Tirana these factors are less relevant because the phenomenon of the child overscheduled with extracurricular activities is very rare. On a typical day, public school children finish classes around 12.00-1.00 pm and return home for lunch. Sports and other activities occur later in the afternoon. They are not combined with school activities as public schools are not equipped for this purpose (nor do they include cafeterias). Also, children are assigned a substantial amount of homework. To allow sufficient time for homework, children from middle and upper income families tend to partake in few extracurricular activities. Poorer families (which comprise a large number in Tirana) cannot afford to sign children up for enrichment courses (UNICEF 2011; UNICEF 2012).

Below we reiterate some of the most typical findings of comparative reviews.

Davison *et al.* (2008) show that children from low socio-economic backgrounds are more likely to actively commute. This is mainly attributed to differences in residential location as opposed to differences in family car ownership which are observed in Tirana. Age and enjoyment of physical activity are not consistently related to active commuting rates. Often, parents' busy work schedules or children's after-school commitments interfere with the possibility of walking or cycling. Other socio-economic indicators are related to parental attitudes: having parents who have actively commuted to school as children, or currently walk or cycle to work, increases the probability that a child will actively commute to school. The same is true when parents value physical activity and the accompanying social interactions for their children.

More pertinent to our study are environmental characteristics, such as distance to school, school size, and land use mix. De Boer and Van Goeverden (2007) and Ewing and Greene (2003) found that in a large number of Western cities schools have become larger and more

sparsely located over time, thus increasing home-school distances. The meta-analysis by Davison *et al.* (2008) reveals that distance to school is the strongest predictor of children's mode choice, with larger distances associated with lower rates of active commuting. If the area immediately surrounding the school is more densely populated and if school enrollments are lower (i.e. there is a dense network of smaller schools, as in Tirana) children are more likely to actively commute. Also, the urban character of the neighborhoods where children live, and the availability and safety of sidewalk infrastructure support active commuting. Findings were inconsistent for perceived safety (both related to traffic, crime, and harassment), while no effects were observed for weather or the presence of public transportation. Parents' perception of the environment is a stronger predictor of children's active commuting patterns than objectively measured environmental attributes.

Lubans *et al.* (2011) found that factors which influence the likelihood that children will actively commute to school include neighborhood design, distance, and route safety (mostly corroborated by our research). They also highlight the importance of the constraining influence of parents' restrictions on independent movement, as well as children's own fears of traffic. In contrast, Wong *et al.* (2011) found that, aside from distance, commonly assessed features of the built environment are not consistently related to active school travel. Also, the effect of built environment features on active school travel may vary across age. The built environment near the location of residence was found to be more strongly correlated with mode choice than the built environment around the school. In associations between the built environment and active school travel, temporal variations between morning and afternoon commute were observed too, which may be explained by parental or caregiver schedules and resource availability.

A few studies focused specifically on the relationship between gender and the prevalence of walking or biking to school (see McDonald 2012; McMillan *et al.* 2006). They found that males walk to and from school more than females but the differences were either modest or significantly moderated by caregiver's own walking behavior. In contrast, males' biking commute rates (which are insignificant in Tirana) are much higher than females'. These differences are likely due to the social construction of girls' identities as endangered or in need of protection. Other studies, which have not centered exclusively on gender gaps, have shown an inconsistent relationship between gender and school travel.

The individual studies and reviews above discuss quantitative school travel research. A few qualitative studies (by Lang *et al.* 2011; Faulkner *et al.* 2010; Mitchell *et al.* 2007; Fusco *et al.* 2012), which include depth-interviews with parents and draw on children's own narratives and pictures, provide further (and a more nuanced) understanding of school trip modal choice. These studies found that the ecological acuity of children who are chauffeured to and from school is reduced and the physical and social worlds available to them are shrinking. They are only cognizant of the trip end points, and do not engage with the local spaces in between, which are critical to learning about the environment. At the same time, many children desire to travel to school actively and independently and experience their surroundings firsthand, but are limited in their ability to do so, given the fear and obstacles that prevail within their neighborhoods. These are physical but also psychological (i.e. the prevalent social construction of children as dependent, vulnerable, and in need of constant adult guidance and supervision). Parental decision making about the trip to school mode is strongly influenced by concerns over the child's safety, as well as a perception of which option is more convenient (especially if parents must trip chain).

In summary, the main factors that support active school travel in western settings appear to be (not necessarily in order of importance):

- Short home-school distances
- Lower socio-economic background
- Urban character of residence neighborhood
- Densely populated school neighborhood
- Caretakers' schedules
- Supportive parental attitudes
- Small school size
- Male gender
- Availability of pedestrian infrastructure and route safety

In the Cyprus based study, Loucaides *et al.* (2010) report low rates of active school traveling among Greek adolescents (19.4%) compared to other European countries (almost 50% in Britain and as high as 80% in the Netherlands and Belgium) despite the country's lower per capita GDP. This suggests that factors unrelated to income may play a central role. However, this study is not readily comparable with the present study and the other studies included in the literature review due to the distinct age groups targeted (youth vs. children).

Land Use and Mobility in Tirana: A Sketch

Tirana is a dense and compact city of about 700,000 inhabitants, without separation of commercial and residential uses. Very dense and chaotic traffic and unruly driving are the norm. Since the demise of the communist regime in 1990, Tirana has become a primate city within Albania.[1] It has almost one third of the national population, most of the national wealth, and more than twice the rate of car ownership than the rest of the country.

The removal of restrictions on population movement within Albania two decades ago led to an enormous wave of migration into the capital. Tirana experienced a population explosion from less than 300,000 to more than 650,000 (more than 800,000 in the metropolitan area). Despite the strain that internal migration placed on urban infrastructure, the urban economy improved at a fast pace, due to the transformation to a market economy and substantial remittances from numerous emigrants abroad.

Most of the capital's growth was accommodated within its pre-existing boundaries. In order to satisfy new housing and service demand, new mid-rise apartment buildings (typically ten to twelve stories) were built at a phenomenal pace, squeezed among existing buildings. The inner city remained the most desirable place to live. However, the poor were not pushed out because they obtained their flats at nominal prices during the privatization. Thus the city retained a social mix. Now, Tirana's density (approximately 14,500 inhabitants/sq. km) is high. However, its overall population and size are small compared to other European capitals. While the central city is very compact, the metropolitan area sprawls beyond the Tirana city boundary among seven other small municipalities, which consist largely of informal settlements built by the poorest portions of the new migrants from the countryside. While encompassing mostly single-family homes, peri-urban settlements have relatively high density as well.

The inner city is vibrant and offers private services and amenities comparable to Western European cities. This is a direct result of the densification, the fine-grained land use pattern, and the economic transformation. On the other hand, the public sector obtains only meager revenues due to the fact that much of the income within the country is earned through remittances and informal channels and is therefore not taxable. For more background information on Tirana, refer to Pojani (2010).

In terms of mobility, private car ownership was prohibited during communism. However, unlike other socialist states Albania did not create a decent public transport system. After the transition, when restrictions were removed, car ownership skyrocketed. Now, more than half of the city's households own a car. The middle and high income portions of the population are increasingly car-dependent. Not only were cars purchased to fulfill mobility needs (i.e. to counterbalance the poor quality of public transport, pedestrian, and bike facilities), but are also seen as symbols of freedom and social status.

The shift from public and non-motorized transport modes towards private cars has led to a host of problems including enormous health and environmental damage. The capital was not designed to accommodate cars and is chocked with traffic much of the day (Pojani 2011b). The urban population must endure high levels of air and noise pollution. The mass of pedestrian traffic must navigate under unpleasant conditions, including constantly having to dodge heavy traffic, cars parked on the sidewalks, and dense pedestrian traffic. The inadequate number of traffic signals makes street crossing a treacherous experience. Bicycling was popular before 1990, although this was a privilege only of adults, since few families could afford to purchase bikes for their children. Despite the mild weather and flat topography, for all but few inhabitants bicycling is no longer considered an option, due to the heavy traffic. In addition, there has been an alarming increase in obesity rates (with a prevalence of 22% in men and 31% in women), including childhood obesity (3.8% among 9-10 year old children), and a decrease in physical activity (Shapo *et al.* 2003; Hyska *et al.* 2009; Shapo *et al.* 2004), which may be related to the ever greater car dependence and the conversion of neighborhood parks into building lots and parking lots.

Children are particularly exposed to the risk of accidents in a frenetic city like Tirana, which does not have an appropriate pedestrian and cyclist infrastructure, nor sufficient traffic lights or road signs. The Albanian Institute of Public Health has reported that traffic fatalities cause 13% of children's deaths in Tirana (*Gazeta Panorama*, 8 June 2009). Drivers' mistakes cause about half of child injuries and deaths (Qiriako 2008). While road traffic crashes are a leading cause of child fatalities in Europe, children living in low and middle income countries have a 1.6 times higher risk of dying from road traffic injury compared with children from higher income countries (WHO 2008). The Tirana Directorate of Public Schools has repeatedly issued press releases in order to draw attention to the high accident risks faced by children in inner-city schools and to the need for traffic calming devices near schools (Fig. 1). High traffic levels around schools in the morning and afternoon peak have led to the mistaken belief that most children commute by car.

Recently, steps have been taken to deal with urban traffic and transport issues. Curb ramps for the handicapped and speed bumps are being installed, and a few streets in the center have been converted to exclusive pedestrian use. But existing plans for the creation of an extensive network of exclusive bus and bike lanes have been slow to materialize. The City has announced that it will take steps to promote active school travel in the future. However, low budgets and an extremely politicized planning environment dominated by political parties are barriers to carrying out sustainable urban transport planning.

Figure 1. Parked cars blocking the sidewalk in front of the entrance of one of the schools in this study. Photo by authors.

School Access

In Albania, the public sector is still the main provider of educational services. In Tirana the total student population in public 9-grade schools (ages 6-15) is approximately 50,500. There are 62 public and 42 private 9-grade schools. No data is available on the number of students in the private schools, but this group is small in size relative to the public schools. The size of the public 9-grade schools varies substantially. Older schools in more central locations accommodate as many as 1,500 students, while some newer schools have only 200 to 300 students. The number of female students is only slightly lower than the number of male students (47% vs. 53%) (City of Tirana 2012).

It must be noted that Albania has a relatively young population, with children under 15 constituting nearly one fifth of the population in Tirana. Therefore, Tirana houses a higher proportion of school-age children than in most European cities. The substantial in-migration combined with scarce public resources to build new schools and hire additional teaching staff has affected the quality of education. In public schools the average classroom size is 32 to 33 students. The new Tirana master plan foresees the construction of a few new public schools in areas where they are missing; also, renovation projects for existing schools are ongoing (City of Tirana 2012). The overcrowding in public schools in addition to a growing middle

income population is leading to increasing enrollment of children from higher income households in private schools, which offer better facilities and higher teacher-student ratios.

While the location of public schools has been traditionally determined by the City of Tirana based on service radii, private schools follow a market based approach, choosing to locate either (a) in smaller buildings in higher income areas, or (b) on spacious, less expensive lots in suburban areas. Often they offer door-to-door shuttle services for the transport of students, especially when located outside the center.

However, school access is generally adequate and schools are well distributed, especially in the inner city (Fig. 2). During enrollment public schools typically prioritize their spaces for children living in proximity of the school. Truancy is low in public schools (typically in the range of 1%) and, according to Tirana Directorate of Education officials, is seldom the result of poor physical access (i.e. home-school distance) to schools (Tirana Directorate of Education 2012). Socio-economic data on 29 public schools available at the Tirana Directorate of Education indicates that child poverty is substantial. On average, 10% of the students live under the minimum standard but this figure is as high as 20-30% in some more peripheral schools. Single-parent households and being orphaned are poverty risk factors, which affect up to 10% of the student population. Children from Roma families, who constitute less than 5% of the total, are also very likely to suffer from poverty and marginalization, and exhibit high school dropout rates. They are clustered in a few schools, with minimal numbers in others (Tirana Directorate of Education 2012). Disability limits school access too, due to a combination of factors, including poor handicapped access in city streets and within schools, lack of special education staff, and a widespread mentality among parents that it is best to keep handicapped children at home in order to protect them. In Tirana there are 1,580 handicapped children but less than half (43%) attend 9-grade schools (Save the Children 2010; AFRPD 2005).

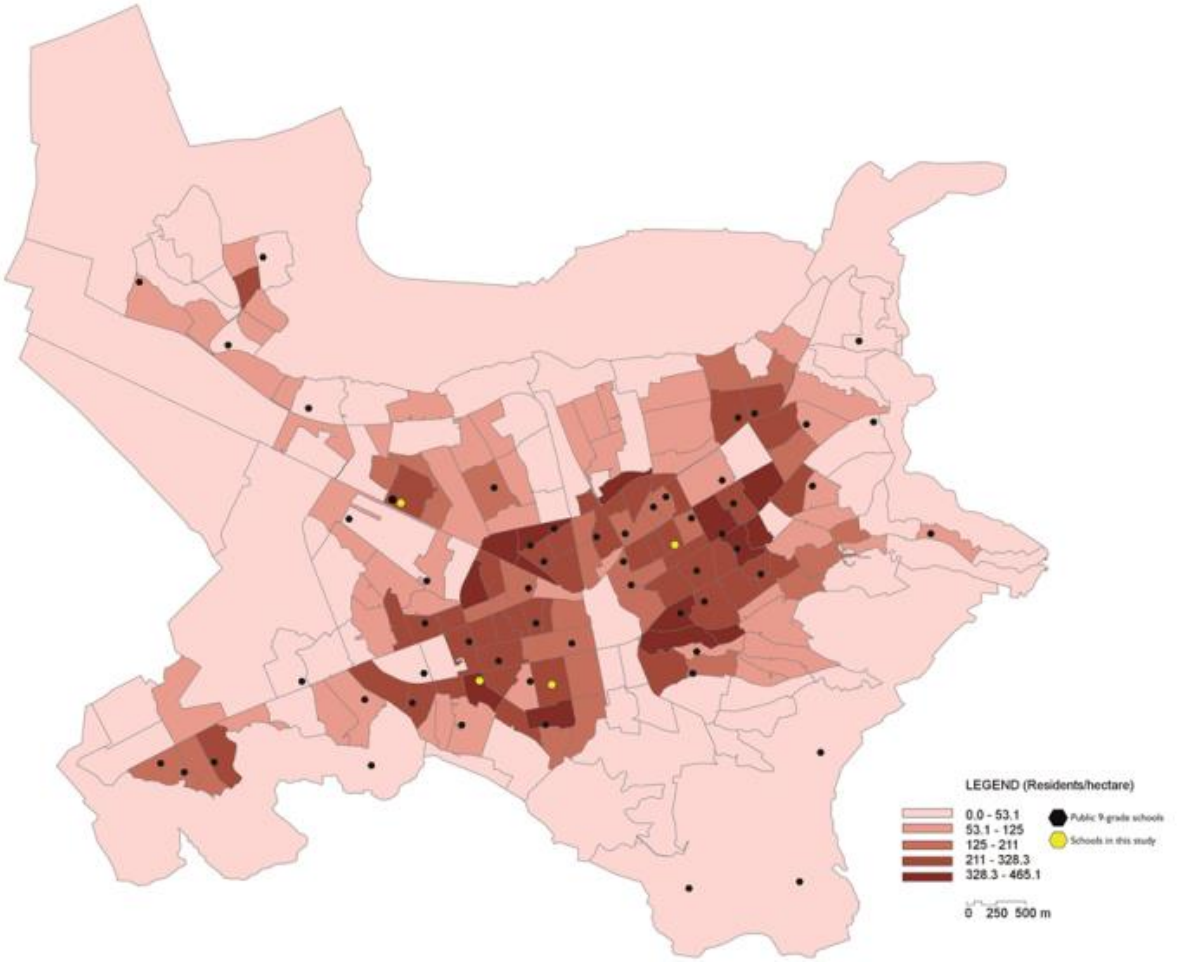

Figure 2. Location of public schools in Tirana. Map courtesy of the City of Tirana (modified by authors.)

Study Design, Data, and Method

Two levels are taken into consideration in the present study: the family level (micro-level) and the built environment level (macro-level), based on the social-ecological theoretical model constructed by Bronfenbrenner (1994) and Sallis *et al.* (2008). Interactions between these two levels are accounted for by including variable sets from both in a regression model. The choice of variable sets is based on the following hypotheses:

- Variable set: gender, child's age, parental age, birth order, number of siblings, parents divorced. The hypothesis is that these variables implicitly determine the child's freedom at the family level, with male children, older children, non-firstborn children, children with siblings, and children of divorced parents walking to school more often than others.
- Variable set: parental concern, parental perception of distance, reputation-conscious parents, protective parents, parents' home-school travel behavior during childhood, and perceived burden of child escorting activities. The hypothesis is that these variables explicitly determine the child's freedom at the family level, thereby affecting the probability that the child walks to school.

- Variable set: parents' education, parents' exposure to the news, and parents' familiarity with the city. The hypothesis is that the children of parents who are more aware of urban dangers experience less freedom in home-school travel.
- Variable set: number of cars per household, household income, and dual-earning households. The hypothesis is that children from wealthier households are driven to school more often than others.
- Variable set: travel time, travel distance, number of road crossings, and school location (dummy). The hypothesis is that longer travel time, greater distance, more crossings, and a more car-oriented location school setting reduce children's chances of walking to school.

The Tirana Directorate of Education allowed the surveyors to arrange to have the teachers distribute the survey questionnaire to the students in the 6^{th}, 7^{th}, and 8^{th} grades in four selected schools. The age range was selected after a few preliminary inquiries, which indicated that at this age children in Tirana start travelling more autonomously.

All four schools included in the survey ("E Kuqe", "Vasil Shanto", "Edit Durham", and "28 Nëntori") are relatively large, with a student population ranging from 900 to 1400. They were selected for this study because they are located in contrasting settings in terms of neighborhood age, accessibility, and vehicular traffic exposure. School "E Kuqe" is located in a historic, densely-built, peripherally located neighborhood, with predominately single family housing and narrow roads. The school faces a traffic road albeit not a busy one. School "Vasil Shanto" is located in an inner city neighborhood with mid-rise multi-family housing mostly built during the communist era. The school faces a busy traffic intersection. School "Edit Durham" is located in a highly desirable central city neighborhood which includes communist-era mid-rise multi-family housing and high-rise condominium buildings built after communism. The school is located in the neighborhood interior on a small street. School "28 Nentori" is located in a peripheral neighborhood with a housing mixture (mid-rise communist-era multi-family housing and high-rise condominium buildings and small single-family houses built after communism). The school sits at the edge of a highway.

Questionnaires were distributed to students during class time, with a request that they be filled out at home by the parents. Four-hundred-seventy-two completed questionnaires were collected in the schools a few days later, with a response rate of 34%. The questionnaire included inquiries about the child's mode of travel to and from school, as well as behavioral, demographic, and environmental questions. Variables measured by the survey are listed in the first column of Table 5. Most are binary variables (no = 0, yes = 1), other variables are ordinal (representing a degree or level, such as the level of parental concern), and some are continuous (such as age).

The survey responses were analyzed using descriptive statistics, and a Pearson's correlation matrix was applied to identify possible relationships between variables. Based on the corresponding significance thresholds, the surveyed literature, and our insights on the urban fabric of Tirana and the travel patterns of its inhabitants, a number of variables were selected to be included in a series of logistic regression models. The dependent variable was whether or not students walk to school. In each equation, we included dummy variables that control for differences between the four schools. These variables were unobserved by the independent variables. All interpretations derived from logistic regression results are based on the observed odds ratio, which is represented by exp(B). The odds ratio is the ratio between the odds of the child walking and the odds of the child not walking, depending on the fulfillment of the condition set by the considered (binary) predictor. In case of an ordinal predictor (instead of binary), the odds ratio represents the change in odds that the child will be walking, depending on a one level increase of the value of the considered predictor.[2] Two

additional simple models were applied in order to elucidate the possible causality between walking behavior and obesity.

Findings and Discussion

Descriptive Statistics

We found that an overwhelming majority of students (78.9%) walk to school; only 13.5% are driven to school, while bicycling and bus use are minimal. Similar results were obtained from a survey in two 9-grade schools in Shkodra, a smaller city in Northern Albania (Mobalb 2012). The proportions of students walking is exceptionally high compared to Western countries.

The sample included 55.7% of boys and 44.3% of girls, with an average age of about 12. Overall, 12.7% of the surveyed families stated that their income is below average, 71.8% stated that their income is average, and 15.5% stated that it is above average.[3] The share of families that own at least one car is 60.5%. Tables 1-4 present descriptive statistics of children's home-school travel.

Home-school distances and travel times in our sample are relatively short (61.3% of students live less than 900 meters from their school and 87.0% travel to school in less than half an hour). Often, schools can be reached by walking on sidewalks and through neighborhood streets. Many students, particularly girls, walk to school as part of a larger group of schoolmates, especially if they have to cross major traffic roads on the way.[4]

We found overpowering concerns among parents in regards to traffic accidents and kidnapping or harassment on the child's way to school, which mirror the findings of international studies. While traffic accidents present a real problem, child abduction is a rare occurrence in Tirana. In the future, parental concerns over factual and perceived dangers could lead to a situation in which more parents drive their children to school as incomes and car ownership increase.

Only a small percentage of Tirana's schoolchildren is obese: 4.4% reported by parents in our study and 3.8% according to 2009 data for children aged 9-10 (Hyska *et al.* 2009). On the other hand, the proportion of children who are overweight is on the rise, standing at 18.1% among children aged 9-10 in 2009 (Hyska *et al.* 2009).[5] We asked parents whether they thought their child is obese, but did not take anthropometric measurements (height and weight). The study by Hyska *et al.* (2009) relied on anthropometric measurements.

According to our data, children who are driven to school are more likely to be obese compared to those who walk. Also, they usually are in higher-income families, live farther from the school, and typically one or more major traffic roads (as indicated by parents) are present between their home and school. However, home-school distances of less than one kilometer are too short to have a large impact on daily exercise levels, and that diet (richer in wealthier, car-owning families) is more likely to be the main contributor to obesity.

Not asking separate questions about the morning and afternoon trip is a significant omission of the present study. Other researchers are encouraged to examine the morning and afternoon trip separately in future work on school travel in Albania and elsewhere in Eastern Europe. Generally, we would expect walking rates to be higher in the trip from school because it takes place while parents (or at least fathers, who are most likely to drive), are still at work. In the morning driving parents can drop off children on the way to work so the number of children being driven might be higher then.

Correlation and Regression Analysis

Table 5 contains selected correlation coefficients and corresponding significance levels, stressing children's school travel mode and family and route characteristics. Only statistically significant correlations are reported. Table 6 shows the results, including odds ratios, significances, and pseudo-R-squared, of three logistic regression equations with "child walks to school" as a dependent variable, and two equations with "child is obese" as a dependent variable. Since the significance levels of some of the explanatory variables differ between car-owning households and carless households, a distinction was made between these two groups.

The correlation analysis reveals that walking to school is negatively associated with (a) car ownership and household income, (b) the presence of major road crossings on the way to school, and (c) physical distance, travel time, and perception of distance to school. Gender did not have a significant impact on walking rates but it had an impact on children's autonomy, with girls more likely to be escorted to school. Also, the data suggests (though not at a statistically significant level) that girls do not cycle and use public transport less frequently, which is compensated by some additional car use. These findings indicate that in Tirana, as elsewhere, parents have a more protective attitude towards girls. However, girls' walking rates are exceptionally high, which might be explained by Tirana's relatively high gender equality inherited from communism. The number of siblings and the birth order do not have significant correlations with the mode choice.

Children are more likely to be driven to school if: (a) their family is wealthier and owns a car (car ownership is positively correlated with household income), (b) major road crossings are present on the way to school, or (c) the school is, or is perceived to be, farther from home (in terms of time and distance). Children who travel by bus are also more likely to live farther from the school and encounter major road crossings on the way. Conversely, with increasing home-school distance, the likelihood of having to cross major traffic roads increases as well. Home-school distance and household wealth are not correlated because the city includes a social mix, as mentioned.

Children are less likely to travel to school unaccompanied if: (a) there are major road crossings on the way to school, (b) they are girls, (c) the travel time to school is longer, (d) the parents are highly concerned about child safety and comfort on the way to school, and (e) when the parents are generally more protective. Parents' protective attitude was measured by asking if (a) they allow the child to stay home alone for a few hours, (b) they allow the child to play outside with other children, and (c) they know at all times what their child is doing. About half of the surveyed parents are very concerned about the daily school trip of their child. Group walk, short home-school distance, and the increasing age of the child mitigate parental concerns. Parents experience driving their child to school as much more of a burden compared to walking their child to school; this is possibly explained by the fact that women are less likely to drive in Tirana (Pojani 2010a). No differences appear if parents are more or less educated and/or conscious about how they are perceived by other parents and teachers if they do not accompany their children.

The first regression model, in which all households are included (Table 6.1), reveals that both home-school distance and car ownership are main factors in determining whether a child walks to school or not. Every additional ten minutes of travel time to school reduces the odds of the child walking to 48%. The presence of a car in the family reduces the odds of a child walking to school to 40%. The strong reduction of odds has to do with the probability that children are driven to school (i.e. choose the alternative mode), thus capturing the effect of car ownership. As seen in Table 2, only 4% of children in carless families are driven to

school, while in car owning families this figure is fivefold. Meanwhile, the percentage of children who walk in carless families is 89.1% compared to 74.1% in car-owning families. Such high rates of walking, even among students whose parents own cars, are unusual in most European cities, and warranted further investigation. Therefore the regression model was repeated once for carless households and once for car-owning households.

In carless households, distance appears to be the only determinant in the choice to walk to school (Table 6.2). In car-owning households, by contrast, not only distance but also income, the presence of major traffic road, and the level of parental concern play a role in the decision to drive children to school (Table 6.3). An increase in the level of income results in a reduction of the odds of the child walking to school to 33%. Major road crossings are present along the way to school for most children: only 25.3% do not need to cross major roads, while 51.9% must cross at least one and 22.8% are faced with two or more (as reported by parents). With every additional major road crossing along the way, the odds of the child walking to school are reduced to 39%. Parental concern over safety is expressed in three levels (1 = unconcerned; 2 = average concern; 3 = very concerned). We observe that an increase in the level of concern reduces the odds of the child walking to school to 47%, compared to a lower level of concern.

In regards to health outcomes, in car-owning households obesity appears to be influenced by walking behavior – i.e. it is lower if the child walks to school (Table 6.4). In contrast, in carless households there was no significant correlation between obesity and walking rates (Table 6.5). This might indicate that there are other unhealthy patterns which commonly accompany bringing children to school by car.

An analysis based on non-observed differences between the schools reveals that children attending schools “E Kuqe” and “Vasil Shanto”, especially the latter, are significantly less likely to walk than children who attend schools “Edit Durham” and “28 Nentori”. Only 66% of students at “Vasil Shanto” walk to school while 21% are driven by car and 13% go by bus. This difference may be explained by the location of the school relative to road infrastructure, discussed earlier. We hypothesize that income levels may also play a role but our data is not detailed enough to confirm this.

Conclusion

This study found that an overwhelming majority of students, including those from car-owning families, walk to school, while bicycling and bus use are minimal. This finding is impressive in view of the situation in most other European cities. Some of our other findings on factors affecting the modal choice for the school commute (distance and urban environment) confirmed the results of prior studies. One contrast with prior studies was that socio-economic background played a role only for car-owning families. Many surveyed variables, including gender, family composition, certain parental attitudes, familiarity with the city, or exposure to the news (broadcasting single cases of child adductions and other unlikely perils) did not yield statistically significant results. Obesity, which is the focus of many international studies, did not emerge as a significant issue.

Students that walk to school do so more often as part of a larger group of schoolmates, attend schools that are located relatively near their house, are faced with relatively few major traffic road crossings during their journey, and are from families that are less likely to own a car. Students who are driven to school usually have higher-income families and live farther from the school. The prevalence of group walk is another unique finding, which could be harnessed to mitigate future travel behavior change.

These findings demonstrate that active school travel is associated with environmental characteristics. For children from carless families, travel time is the only explanatory variable in mode choice. Although Tirana's high residential density and compactness has some environmental drawbacks, it is positive in that it allows for students living in close proximity of each other and of the schools. A high number of school-age residents compared to the rest of Europe and the fine-grained pattern of the urban public school network (at least in the inner city) contributes to the short distances between residences and schools. Many children are able to join a friend or group of friends for the home-school journey, thus mitigating parental concerns over safety. These circumstances are replicable in urban settings but not in low-density suburban environments.

On the other hand, the presence of a car in the family appears to be the chief predictor of the likelihood that a child will be driven to school. Car ownership strongly correlates with household income and, with a growing economy, it is expected to increase. This represents a potential threat to the livability and safety of the city and it might cause a drop in walking-to-school rates, with more children becoming car dependent. In addition, current, heavy and uncontrolled car traffic in proximity of schools is a deterrent to active school travel and child independence, and makes the experience of those who walk much less pleasant. We found that, in car-owning families, the perception of danger and the household income play a role in children's mode choice for the commute. Safety concerns appear to be typical across cultures.

To maintain the current walking rates in Tirana, our main public policy suggestions are (1) the introduction of traffic calming and control devices within a determined radius of 9-grade schools, e.g. 600 m, as nearly half of the surveyed students live within that distance, and (2) the promotion of semi-formal "walk-share" or "walking school bus" groups of schoolmates walking to school. Awareness-raising of parents and teachers on the real and perceived dangers, as well as benefits, of walking trips to school would be another important element of these schemes, which could be implemented by means of School Travel Plans.[6] Also, perceptions of car use among parents, as well as the population at large, as being anti-social need to be enhanced. These relatively modest policies are feasible in the context of Tirana.

Longer-term challenges, which require stronger political will and much greater funding, are the containment of peri-urban sprawl and the management and restriction of car travel in general. A lack of transport policies that prioritize pedestrians and cyclists might lead affluent parents to prohibit their children from walking to school. Transport and education policy must come together to maintain a dense network of good schools.[7] Naturally, a more pedestrian-friendly city for children would be a better city for all residents.

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Tables

Table 1. General survey characteristics.

No. of schools surveyed	4		
Total responses	472		
Total child population (grades 6-8)	~18,000		
Schools	Child population by school surveyed (grades 6-8)	Responses (no.)	% of students surveyed (grades 6-8)
E Kuqe	308	66	21.4
Vasil Shanto	467	78	16.7
Edit Durham	481	86	17.9
28 Nentori	405	242	59.8

Table 2. Modal split.

	Distance home-school			
	All distances		More than 900 meters*	
Home-school travel mode	No. of students	% of students	No. of students**	% of students
All households				
Walking	362	78.9%	51	67.1%
Bus	25	5.4%	5	6.6%
Car	62	13.5%	19	25.0%
Bike	7	1.5%	1	1.3%
Households without cars (39.5%)				
Walking	155	89.1%	24	80,0%
Bus	10	5.7%	3	10,0%
Car	7	4.0%	3	10,0%
Bike	2	1.1%	0	0,0%
Car-owning households (60.5%)				
Walking	200	74.6%	26	57.8%
Bus	11	4.1%	2	4.4%
Car	54	20.1%	16	35.6%
Bike	3	1.1%	1	2.2%
Households with above-average incomes (15.5%)				
Walking	37	56.1%	7	43.8%
Bus	3	4.5%	0	0.0%
Car	26	39.4%	9	56.3%
Bike	0	0.0%	0	0.0%
By gender (boys / girls)				
Walking	159 / 203	79.1% / 79.6%	25 / 26	67.6% / 66.7%
Bus	12 / 13	6.0% / 5.1%	3 / 2	8.1% / 5.1%
Car	23 / 39	11.4% / 15.3%	8 / 11	21.6% / 28.2%
Bike	7 / 0	3.5% / 0.0%	1 / 0	2.7% / 0.0%

Notes:

* A considerable amount of data is missing in this subsample because many respondents did not answer the question on distance.

** Statistical significances associated with such small subsample sizes (in highlighted cells) are very low. However, we indicate the percentages in order to provide an idea of the magnitude.

Table 3. Home-school distance.

Students traveling	Average distance (meters)
All	873
Walking	771
Not walking	1274
	Average travel time (minutes)
All	15
Walking	13
Not walking	20

Table 4. Child autonomy.

Student's travel characteristics	Proportion
Travels to school with others (children or adults)	61.7%
Travels to school with other children (schoolmates or older siblings)	29.9%
Travels to school alone	38.3%
By age	
11	38.2%
12	36.3%
13	44.7%
By gender	
boys	45.8%
girls	32.1%
By home-school distance	
less than 300 m	42.2%
300-600 m	40.0%
600-900 m	35.1%
more than 900 m	36.0%

Table 5. Selected correlation coefficients.

surveyed variable	child walks to school	child travels by bus	child travels by car	child travels with others
gender (reference = girl)	-	-	-	-0.140**
student's age	-	-	-	-0.115*
mother's age	-	-	-	-
father's age	-	-	-	-
firstborn child	-	-	-	-0.097*
total number of siblings	-	-	-	-
child travels with others	-0.180**	-	0.225**	(1.000)
child travels with other children	0.277**	-0.101*	-0.235**	-0.530**
child walks to school	(1.000)	-0.464**	-0.763**	0.277*
child travels by bus	-0.464**	(1.000)	-0.095*	-0.101*
child travels by car	-0.763**	-0.095*	(1.000)	-0.235**
household owns a car	-0.167**	-	0.229**	-
degree of parental concern	-	-	-	-0.191**
parents' perception of distance	-0.169**	-0.126**	0.142**	0.100*
parents are reputation conscious	-	-0.100*	-	-
travel time	-0.190**	-	0.189**	0.158**
physical distance	-0.230**	-0.190**	0.145*	-
number of major traffic road crossings	-0.261**	0.177**	0.182**	0.200**
parental protective attitude	-	-	-	0.225**
child is obese	-	-	0.111*	-
household income	-0.198**	-	0.257**	-
double-income household	-0.122*	-	0.138**	-
parent's education level	-	-	-	-
length of time parents have lived in Tirana	-	-	0.110*	-
as a child, parent went to school accompanied	-	-	-	-
intensity with which parents follow the news	-	-	-	-
divorced parents	-	-	-	-
parents feel accompanying child is a burden	-0.137**	-	0.132**	0.198**

Note: The first column contains all surveyed variables. The other columns show coefficients and significance thresholds for four selected variables (* = $p < 0.05$; ** = $p < 0.01$).

Table 6. Results of logistic regression estimation.

1. All households – dependent variable: "child walks to school"			
independent variable	*B*	*p*-value	exp(*B*)
time distance (<10', <20', <30', ≥30')	-0.739	0.000	0.478
household income (below average, average, above average)	-1.007	0.002	0.365
number of major road crossings (none, one, two or more)	-0.978	0.000	0.376
household owns one or more cars	-0.917	0.021	0.400
level of parental concern (little, average, very concerned)	-0.720	0.004	0.487
dummy for "28 Nëntori" school	-0.218	0.681	0.804
dummy for "E Kuqe" school	-1.035	0.089	0.355
dummy for "Vasil Shanto" school	-2.760	0.000	0.063
Nagelkerke R^2 = 0.40; *n* (valid) = 352			
2. Carless households – dependent variable: "child walks to school"			
independent variable	*B*	*p*-value	exp(*B*)
time distance (<10', <20', <30', ≥30')	-0.997	0.015	0.369
household income (below average, average, above average)	-0.905	0.197	0.404
number of major road crossings (none, one, two or more)	-1.005	0.097	0.366
level of parental concern (little, average, very concerned)	-0.474	0.327	0.622
dummy for "28 Nëntori" school	-18.772	0.998	0.000
dummy for "E Kuqe" school	-19.536	0.998	0.000
dummy for "Vasil Shanto" school	-21.643	0.998	0.000
Nagelkerke R^2 = 0.40; *n* (valid) = 138			
3. Car-owning households – dependent variable: "child walks to school"			
independent variable	*B*	*p*-value	exp(*B*)
time distance (<10', <20', <30', ≥30')	-0.648	0.005	0.523
household income (below average, average, above average)	-1.105	0.003	0.331
number of major road crossings (none, one, two or more)	-0.952	0.002	0.386
level of parental concern (little, average, very concerned)	-0.764	0.010	0.466
dummy for "28 Nëntori" school	0.228	0.698	1.256
dummy for "E Kuqe" school	-0.563	0.410	0.570
dummy for "Vasil Shanto" school	-2.288	0.002	0.101
Nagelkerke R^2 = 0.38; *n* (valid) = 214			
4. Car owning households – dependent variable: "child is obese"			
independent variable	*B*	*p*-value	exp(*B*)
child walks to school	-1.537	0.020	0.215
Nagelkerke R^2 = 0.08; *n* (valid) = 256			
5. All households – dependent variable: "child is obese"			
independent variable	*B*	*p*-value	exp(*B*)
child walks to school	0.829	0.091	0.436
Nagelkerke R^2 =0.02; *n* (valid) = 438			

Notes

[1] A primate city is defined as a leading city in its country or region, disproportionately larger than any others in the urban hierarchy.

[2] Note that there is a difference in meaning between "probability" and "odds". While "probability" measures the expectation that an event will occur, "odds" are also related to the probability that the alternative option will be chosen. Therefore, odds change from 100% to Y% rather than from X% to Y%.

[3] Respondents were asked to state whether they thought their income was "below average", "average", or "above average". They were not asked if their income was within specified ranges because prior experience with population surveys in Tirana indicates that respondents avoid answering those types of questions.

[4] Tirana's physical development pattern includes large "living quarters" created during communism, with multi-family buildings separated by narrow roads, and major urban traffic roads.

[5] The WHO definition of overweight / obesity is: a Body Mass Index (BMI, a simple index of weight-for-height) greater than or equal to 25 is overweight and a BMI greater than or equal to 30 is obesity.

[6] In the city of Shkodra in northern Albania, an NGO working on mobility issues (Mobalb) is offering assistance to two local schools in setting up School Travel Plans.

[7] A study conducted in Germany found that, while maintaining a dense school network is economically inefficient, school consolidation carries considerable transport, health, and environmental costs (Müller *et al.* 2008).